

AMENDMENTS TO THE CLAIMS:

The listing of claims will replace all prior versions, and listings of claims in the application:

LISTING OF THE CLAIMS

Claims 1-14 (Canceled)

15. (Currently amended) A lighting apparatus for emitting white light comprising:

a light source emitting radiation at from about 250 to about 550 nm; and

a phosphor composition radiationally coupled to the light source, the phosphor composition comprising $(RE_{1-x}Sc_xCe_y)_2A_{3-p}B_pSi_{z-q}Ge_qO_{12+\delta}$ ($RE_{1-x}Sc_xCe_y)_2A_{3-p}B_pSi_{z-q}Ge_qO_{12+\delta}$, where RE is selected from a lanthanide ion or Y^{3+} , A is selected from Mg, Ca, Sr, or Ba, B is selected from Mg and Zn, and where $0 \leq p \leq 3$, $0 \leq q \leq 3$, $2.5 \leq z \leq 3.5$, $0 \leq x < 1$, $0 < y \leq 0.3$, $-1.5 \leq \delta \leq 1.5$.

16. (Original) The lighting apparatus of claim 15, wherein the light source is a semiconductor LED emitting radiation having a wavelength in the range of from about 350 to about 550 nm.

17. (Original) The lighting apparatus of claim 16, wherein the LED comprises a nitride compound semiconductor represented by the formula $In_iGa_jAl_kN$, where $0 \leq i$; $0 \leq j$, $0 \leq K$, and $i + j + k = 1$.

18. (Original) The lighting apparatus of claim 15, wherein said light source is an organic emissive structure.

19. (Original) The lighting apparatus of claim 15, wherein the phosphor composition is coated on the surface of the light source.

20. (Original) The lighting apparatus of claim 15, further comprising an encapsulant surrounding the light source and the phosphor composition.

21. (Original) The lighting apparatus of claim 15, wherein the phosphor composition is dispersed in the encapsulant.

22. (Original) The lighting apparatus of claim 15, further comprising a reflector cup.

23. (Original) The lighting apparatus of claim 15, wherein said phosphor composition comprises $(Lu_{0.955}Ce_{0.045})_2CaMg_2Si_3O_{12}$.

24. (Currently amended) The lighting apparatus of claim 15, wherein said phosphor composition comprises two or more distinct phosphors having the formula $(RE_{1-x}Sc_xCe_y)_2A_{3-p}B_pSi_{z-q}Ge_qO_{12+\delta}$ $(RE_{1-x-y}Sc_xCe_y)_2A_{3-p}B_pSi_{z-q}Ge_qO_{12+\delta}$, where RE is selected from a lanthanide ion or Y^{3+} , A is selected from Mg, Ca, Sr, or Ba, B is selected from Mg and Zn, and where $0 \leq p \leq 3$, $0 \leq q \leq 3$, $2.5 \leq z \leq 3.5$, $0 \leq x < 1$, $0 < y \leq 0.3$, $-1.5 \leq \delta \leq 1.5$, wherein each of said distinct phosphors has a different emission spectrum.

25. (Original) The lighting apparatus of claim 15, wherein said phosphor composition further comprises one or more additional phosphors.

26. (Previously presented) The lighting apparatus of claim 25, wherein said one or more additional phosphors are selected from the group consisting of $(Ba,Sr,Ca)_5(PO_4)_3(Cl,F,Br,OH):Eu^{2+},Mn^{2+},Sb^{3+}$; $(Ba,Sr,Ca)MgAl_{10}O_{17}:Eu^{2+},Mn^{2+}$; $(Ba,Sr,Ca)BPO_5:Eu^{2+},Mn^{2+}$; $(Sr,Ca)_{10}(PO_4)_6 \cdot nB_2O_3:Eu^{2+}$; $2SrO \cdot 0.84P_2O_5 \cdot 0.16B_2O_3:Eu^{2+}$; $Sr_2Si_3O_8 \cdot 2SrCl_2:Eu^{2+}$; $Ba_3MgSi_2O_8:Eu^{2+}$; $Sr_4Al_{14}O_{25}:Eu^{2+}$; $BaAl_8O_{13}:Eu^{2+}$; $(Ba,Sr,Ca)Al_2O_4:Eu^{2+}$; $(Y,Gd,Lu,Sc,La)BO_3:Ce^{3+},Tb^{3+}$; $Ca_8Mg(SiO_4)_4Cl_2:Eu^{2+},Mn^{2+}$; $(Ba,Sr,Ca)_2SiO_4:Eu^{2+}$; $(Ba,Sr,Ca)_2(Mg,Zn)Si_2O_7:Eu^{2+}$; $(Sr,Ca,Ba)(Al,Ga,In)_2S_4:Eu^{2+}$; $(Y,Gd,Tb,La,Sm,Pr,Lu)_3(Al,Ga)_5O_{12}:Ce^{3+}$; $(Ca,Sr)_8(Mg,Zn)(SiO_4)_4Cl_2:Eu^{2+},Mn^{2+}$; $Na_2Gd_2B_2O_7:Ce^{3+},Tb^{3+}$; $(Ba,Sr)_2(Ca,Mg,Zn)B_2O_6:K,Ce,Tb$; $(Sr,Ca,Ba,Mg,Zn)_2P_2O_7:Eu^{2+},Mn^{2+}$; $(Ca,Sr,Ba,Mg)_{10}(PO_4)_6(F,Cl,Br,OH):Eu^{2+},Mn^{2+}$; $(Gd,Y,Lu,La)_2O_3:Eu^{3+},Bi^{3+}$; $(Gd,Y,Lu,La)_2O_2S:Eu^{3+},Bi^{3+}$; $(Gd,Y,Lu,La)VO_4:Eu^{3+},Bi^{3+}$; $(Ca,Sr)S:Eu^{2+}$; $SrY_2S_4:Eu^{2+}$;

$\text{CaLa}_2\text{S}_4:\text{Ce}^{3+}$; $3.5\text{MgO} \cdot 0.5\text{MgF}_2 \cdot \text{GeO}_2:\text{Mn}^{4+}$; $(\text{Ba},\text{Sr},\text{Ca})\text{MgP}_2\text{O}_7:\text{Eu}^{2+},\text{Mn}^{2+}$;
 $(\text{Y},\text{Lu})_2\text{WO}_6:\text{Eu}^{3+},\text{Mo}^{6+}$; $(\text{Ba},\text{Sr},\text{Ca})_x\text{Si}_y\text{N}_z:\text{Eu}^{2+}$.

27. (Original) The lighting apparatus of claim 15, further comprising a $(\text{Tb},\text{Y})_3\text{Al}_{4.9}\text{O}_{12-\delta}:\text{Ce}^{3+}$ phosphor wherein $-1 \leq \delta \leq 1$.

28. (Original) The lighting apparatus of claim 15, wherein $2.9 \leq z \leq 3.1$.

29. (Original) The lighting apparatus of claim 15, wherein $0 \leq q/(z-q) \leq 0.5$.

30. (Original) The lighting apparatus of claim 15, wherein A is Ca.

31. (Original) The lighting apparatus of claim 15, wherein A is Mg.

32. (Original) The lighting apparatus of claim 15, wherein B is Mg.

33. (Original) The lighting apparatus of claim 15, wherein $y \leq 0.05$.

34. (Original) The lighting apparatus of claim 15, wherein said lighting apparatus has a CCT value from about 2500 to 8000.

35. (Original) The lighting apparatus of claim 15, wherein said lighting apparatus has a CRI value of greater than 60.

Claims 36-38(Canceled)

39. (Currently amended) A phosphor composition comprising $(\text{RE}_{1-x-y}\text{Sc}_x\text{Ce}_y)_2\text{A}_{3-p}\text{B}_p\text{Si}_{z-q}\text{Ge}_q\text{O}_{12+\delta}$ $(\text{RE}_{1-x-y}\text{Sc}_x\text{Ce}_y)_2\text{A}_{3-p}\text{B}_p\text{Si}_{z-q}\text{Ge}_q\text{O}_{12+\delta}$, where RE is selected from a lanthanide ion or Y^{3+} , A is selected from Mg, Ca, Sr, or Ba, B is selected from Mg and Zn, and where $0 \leq p \leq 3$, $0 \leq q \leq 3$, $2.5 \leq z \leq 3.5$, $0 \leq x < 1$, $0 < y \leq 0.3$, $-1.5 \leq \delta \leq 1.5$.

40. (Original) The phosphor composition according to claim 39, wherein $2.9 \leq z \leq 3.1$.

41. (Original) The phosphor composition according to claim 39, wherein $0 \leq q/(z-q) \leq 0.5$.
42. (Original) The phosphor composition according to claim 39, wherein A is Ca.
43. (Original) The phosphor composition according to claim 39, wherein A is Mg.
44. (Original) The phosphor composition according to claim 39, wherein B is Mg.
45. (Original) The phosphor composition according to claim 39, wherein $y \leq 0.05$.
46. (Original) The phosphor composition according to claim 39 comprising $(Lu_{0.955}Ce_{0.045})_2CaMg_2Si_3O_{12}$.
47. (Original) The phosphor composition according to claim 39, wherein said phosphor composition is capable of absorbing the radiation emitted by a light source emitting from 400-500 nm and emitting radiation that, when combined with said radiation from said light source, produces white light.
48. (Currently amended) A phosphor blend including a first phosphor selected from the group consisting of $(Tb,Y)_3Al_{4.9}O_{12-\delta}:Ce^{3+}$ wherein $-1 \leq \delta \leq 1$ and $(Tb_{1-x-y-z-w}Y_xGd_yLu_zCe_w)_3M_rAl_{s-r}O_{12+\delta}$, where M is selected from Sc, In, Ga, Zn, or Mg, and where $0 < w \leq 0.3$, $0 \leq x < 1$, $0 \leq y \leq 0.4$, $0 \leq z < 1$, $0 \leq r \leq 4.5$, $4.5 \leq s \leq 6$, and $-1.5 \leq \delta \leq 1.5$, and a second phosphor having the formula $(RE_{1-x-y}Sc_xCe_y)_2A_{3-p}B_pSi_{z-q}Ge_qO_{12+\delta}$ ($RE_{1-x-y}Sc_xCe_y)_2A_{3-p}B_pSi_{z-q}Ge_qO_{12+\delta}$, where RE is selected from a lanthanide ion or Y^{3+} , A is selected from Mg, Ca, Sr, or Ba, B is selected from Mg and Zn, and where $0 \leq p \leq 3$, $0 \leq q \leq 3$, $2.5 \leq z \leq 3.5$, $0 \leq x < 1$, $0 < y \leq 0.3$, $-1.5 \leq \delta \leq 1.5$.

49. (Currently amended) A phosphor composition comprising $(\text{Ca}_{1-x-y-z}\text{Sr}_x\text{Ba}_y\text{Ce}_z)_3(\text{Sc}_{1-a-b}\text{Lu}_a\text{D}_c)_2\text{Si}_{n-w}\text{Ge}_w\text{O}_{12+\delta}$ $(\text{Ca}_{1-x-y-z}\text{Sr}_x\text{Ba}_y\text{Ce}_z)_3(\text{Sc}_{1-a-c}\text{Lu}_a\text{D}_c)_2\text{Si}_{n-w}\text{Ge}_w\text{O}_{12+\delta}$, where D is either Mg or Zn, $0 \leq x < 1$, $0 \leq y < 1$, $0 < z \leq 0.3$, $0 \leq a \leq 1$, $0 \leq c \leq 1$, $0 \leq w \leq 1$, $2.5 \leq n \leq 3.5$, and $-1.5 \leq \delta \leq 1.5$.

50. (Currently amended) The phosphor composition according to claim 49, comprising $(\text{Ca}_{1-z}\text{Ce}_z)_3\text{Sc}_2\text{Si}_{n-w}\text{Ge}_w\text{O}_{12}\text{Ga}_3\text{Sc}_2\text{Si}_n\text{Ge}_w\text{O}_{12}:\text{Ge}^{3+}$.

51. (Currently amended) The phosphor composition according to claim 50, comprising $(\text{Ca}_{1-z}\text{Ce}_z)_3\text{Sc}_2\text{Si}_3\text{O}_{12}\text{Ga}_3\text{Sc}_2\text{Si}_3\text{O}_{12}:\text{Ge}^{3+}$.

52. (Previously presented) The phosphor composition according to claim 50, comprising $(\text{Ca}_{0.99}\text{Ce}_{0.01})_3\text{Sc}_2\text{Si}_3\text{O}_{12}$.

53. (Original) The phosphor composition according to claim 49, wherein said phosphor composition is capable of absorbing radiation having a wavelength of from about 250 to about 490 nm and emitting radiation with an emission maximum at about 505 nm.

54. (Original) The phosphor composition according to claim 49, wherein $2.9 \leq n \leq 3.1$.

55. (Canceled)

56. (Original) The phosphor composition according to claim 49, wherein $x \leq 0.1$.

57. (Original) The phosphor composition according to claim 49, wherein $y \leq 0.1$.

58. (Original) The phosphor composition according to claim 49, wherein $z \leq 0.05$.

59. (Original) The phosphor composition according to claim 49, wherein $a \leq 0.10$.

Claims 60-62 (Canceled)

63. (Currently amended) The phosphor composition according to claim 49, further comprising $(Tb_{1-x-y-z-w}Y_xGd_yLu_zCe_w)_3M_rAl_{s-r}O_{12+\delta}$, where M is selected from Sc, In, Ga, Zn, or Mg, and where $0 < w \leq 0.3$, $0 \leq x < 1$, $0 \leq y \leq 0.4$, $0 \leq z < 1$, $0 \leq r \leq 4.5$, $4.5 \leq s \leq 6$, and $-1.5 \leq \delta \leq 1.5$; and $(RE_{1-x}Sc_xCe_y)_2A_{3-p}B_pSi_{z-q}Ge_qO_{12+\delta}$ ($RE_{1-x}Sc_xCe_y)_2A_{3-p}B_pSi_{z-q}Ge_qO_{12+\delta}$, where RE is selected from a lanthanide ion or Y^{3+} , A is selected from Mg, Ca, Sr, or Ba, B is selected from Mg and Zn, and where $0 \leq p \leq 3$, $0 \leq q \leq 3$, $2.5 \leq z \leq 3.5$, $0 \leq x < 1$, $0 < y \leq 0.3$, $-1.5 \leq \delta \leq 1.5$.

64. (Currently amended) A lighting apparatus comprising a light source emitting radiation having an emission wavelength of from about 250 to about 500 nm and a phosphor composition comprising $(Ga_{1-x-y-z}Sr_xBa_yCe_z)_3(Sc_{1-a-b}Lu_aD_c)_2Si_{n-w}Ge_wO_{12+\delta}$ ($Ca_{1-x-y-z}Sr_xBa_yCe_z)_3(Sc_{1-a-c}Lu_aD_c)_2Si_{n-w}Ge_wO_{12+\delta}$, where D is either Mg or Zn, $0 \leq x < 1$, $0 \leq y < 1$, $0 < z \leq 0.3$, $0 \leq a \leq 1$, $0 \leq c \leq 1$, $0 \leq w \leq 3$, $2.5 \leq n \leq 3.5$, and $-1.5 \leq \delta \leq 1.5$.

65. (Original) The lighting apparatus of claim 64, wherein said lighting apparatus is a white light emitting device.

66. (Original) The lighting apparatus of claim 64, further comprising one or more additional phosphors.

67. (Previously presented) The lighting apparatus of claim 66, wherein said one or more additional phosphors are selected from the group consisting of $(Ba,Sr,Ca)_5(PO_4)_3(Cl,F,Br,OH):Eu^{2+},Mn^{2+},Sb^{3+}$; $(Ba,Sr,Ca)MgAl_{10}O_{17}:Eu^{2+},Mn^{2+}$; $(Ba,Sr,Ca)BPO_5:Eu^{2+},Mn^{2+}$; $(Sr,Ca)_{10}(PO_4)_6*nB_2O_3:Eu^{2+}$; $2SrO*0.84P_2O_5*0.16B_2O_3:Eu^{2+}$; $Sr_2Si_3O_8*2SrCl_2:Eu^{2+}$; $Ba_3MgSi_2O_8:Eu^{2+}$; $Sr_4Al_{14}O_{25}:Eu^{2+}$; $BaAl_8O_{13}:Eu^{2+}$; $(Ba,Sr,Ca)Al_2O_4:Eu^{2+}$; $(Y,Gd,Lu,Sc,La)BO_3:Ce^{3+},Tb^{3+}$; $Ca_8Mg(SiO_4)_4Cl_2:Eu^{2+},Mn^{2+}$; $(Ba,Sr,Ca)_2SiO_4:Eu^{2+}$; $(Ba,Sr,Ca)_2(Mg,Zn)Si_2O_7:Eu^{2+}$; $(Sr,Ca,Ba)(Al,Ga,In)_2S_4:Eu^{2+}$; $(Y,Gd,Tb,La,Sm,Pr,Lu)_3(Al,Ga)_5O_{12}:Ce^{3+}$; $(Ca,Sr)_8(Mg,Zn)(SiO_4)_4Cl_2:Eu^{2+},Mn^{2+}$; $Na_2Gd_2B_2O_7:Ce^{3+},Tb^{3+}$;

(Ba,Sr)₂(Ca,Mg,Zn)B₂O₆:K,Ce,Tb; (Sr,Ca,Ba,Mg,Zn)₂P₂O₇:Eu²⁺,Mn²⁺;
(Ca,Sr,Ba,Mg)₁₀(PO₄)₆(F,Cl,Br,OH):Eu²⁺,Mn²⁺; (Gd,Y,Lu,La)₂O₃:Eu³⁺,Bi³⁺;
(Gd,Y,Lu,La)₂O₂S:Eu³⁺,Bi³⁺; (Gd,Y,Lu,La)VO₄:Eu³⁺,Bi³⁺; (Ca,Sr)S:Eu²⁺; SrY₂S₄:Eu²⁺;
CaLa₂S₄:Ce³⁺; 3.5MgO*0.5MgF₂*GeO₂:Mn⁴⁺; (Ba,Sr,Ca)MgP₂O₇:Eu²⁺,Mn²⁺;
(Y,Lu)₂WO₆:Eu³⁺,Mo⁶⁺; (Ba,Sr,Ca)_xSi_yN_z:Eu²⁺.

68. (Currently amended) The lighting apparatus of claim 64, further comprising at least one phosphor selected from the group consisting of (Tb_{1-x-y-z-w}Y_xGd_yLu_zCe_w)₃M_rAl_{s-r}O_{12+δ}, where M is selected from Sc, In, Ga, Zn, or Mg, and where 0<w≤0.3, 0≤x<1, 0≤y≤0.4, 0≤z<1, 0≤r≤4.5, 4.5≤s≤6, and -1.5≤δ≤1.5, and further wherein at least one of y or z is >0; (RE_{1-x}Sc_xCe_y)₂A_{3-p}B_pSi_{z-q}Ge_qO_{12+δ} (RE_{1-x-y}Sc_xCe_y)₂A_{3-p}B_pSi_{z-q}Ge_qO_{12+δ}, where RE is selected from a lanthanide ion or Y³⁺, A is selected from Mg, Ca, Sr, or Ba, B is selected from Mg and Zn, and where 0≤p≤3, 0≤q≤3, 2.5≤z≤3.5, 0≤x<1, 0<y≤0.3, -1.5≤δ≤1.5; and (Tb,Y)₃Al_{4.9}O_{12-δ}:Ce³⁺ wherein -1≤δ≤1.

69. (Original) The lighting apparatus of claim 64, wherein the light source is a semiconductor light emitting diode.

70. (Original) The lighting apparatus of claim 64, wherein said lighting apparatus has a CRI value of greater than 60.

71. (Original) The lighting apparatus of claim 64, wherein said phosphor comprises Ca₃Sc₂(Si_xGe_{1-x})₃O₁₂:Ce³⁺, wherein x is from 0.67 to 1.0.

72. (Original) The lighting apparatus of claim 64, wherein said phosphor comprises Ca₃Sc₂Si₃O₁₂:Ce³⁺.

73. (Previously presented) The lighting apparatus of claim 64, wherein said phosphor comprises (Ca_{0.99}Ce_{0.01})₃Sc₂Si₃O₁₂.

THE OFFICE ACTION

In the final Office Action issued on December 6, 2005, the Examiner presented a number of objections/rejections.

The Examiner objected to the specification for failing to provide proper antecedent basis for the claimed subject matter in claims 12-14, 16, 24, 27-35, 38, 40-45, 47, 48 claims 51, 53, 61 and 63. The Examiner indicated that the information disclosure statement filed October 20, 2005 was not considered because a form PTO-1449 was not received.

The Examiner objected to informalities in the formulas of several of the phosphors in the specification and claims.

The Examiner rejected claims 1-3, 6-8, 10, 11, 13, 36 and 38 under 35 U.S.C. §103(a) as being clearly unpatentable over WO 01/085452 or U.S. Patent No. 6,669,866. The Examiner also rejected claims 1-3, 5-9, 13, 14 and 36-38 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent 6,596,195. Claims 1-3, 5-11, and 36-38 were rejected by the Examiner under 35 U.S.C. §103(a) as being obvious over U.S. Patent Publication No. 2004/0159846. The Examiner further rejected claim 4 35 U.S.C. §103(a) as being unpatentable over 6,669,866; 6,596,195; copending application 10/368,115; or 2004/0159846 and further in view of U.S. Patent No. 6,335,548. Claims 1-11, and 36-38 were rejected under the judicially created doctrine of double patenting over 6,596,195 or copending application 10/368,115; either alone or in combination with another reference.

The Examiner indicated that claims 15, 24, 39, 48, 49, 63, 64, and 68 would be allowable if amended to overcome the objections. Likewise, claims 16-23, 25-35, 40-47, 50-54, 56-59, 65-67 and 69-73 were only objected to as being dependent on an objected to base claim.

REMARKS

Amendments have been made to the specification and claims to address the Examiner's objections/rejections to these. Claims 15-35, 39-54, 56-59 and 63-73 remain pending in the application.

With regard to the IDS, Applicants submit herewith a new IDS containing a new form PTO-1449.